UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,839	03/31/2000	Ariel Berkovits	2207/6856	9593

7590   08/29/2002

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EXAMINER
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ART UNIT	PAPER NUMBER
2186	7

DATE MAILED: 08/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _07 August 2002_ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-30_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-30_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: .

DETAILED ACTION

Response to Amendment

This Office Action is in response to applicant's communication filed August 7,

2002 in response to PTO Office Action dated May 8, 2002. The applicant's remarks

and amendment to the specification and/or claims were considered with the results that

follow.

Claims 1-3- have been presented for examination in this application. In response

to the last Office Action, claims 1, 3, 4, 6, 9, 11, 12, 17, 19, 20, 25, and 30 have been

amended.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 9-13, 17-21, and 25-30 are rejected under 35 U.S.C. 102(b) as being

anticipated by Csoppenszky (US# 5,802,568).

Regarding claims 1, 9, 17, 25, 26, and 30, Csoppenszky teaches pseudo-LRU

caching system including an invalidation scheme in associative caches. Figures 2 and

3 portray a system for lowering the importance level of cache lines. When an operation

for replacing a cache line begins, the memory is searched first for invalid items. Should

all of the memory items be both valid and have their used bits set, all used bits are

cleared except the bit indicated by signal ADDR from multiplexor (125) (col. 4, line 22 –

col. 5, line 32). Thus, the importance of the memory line with said signal ADDR used bit

still marked has been reduced below that of the other memory lines.

Regarding claims 2, 9 (cont.), 10, 18, 27, and 30, by clearing all cache lines but

one, said cache line's importance has been reduced to the point of being replaced

before all other valid cache lines (column 1, lines 58-60; abs.).

Regarding claims 3, 11, 19, and 28, uncleared cache lines are replaced before

other valid cache lines which adhere to the LRU scheme (abs., lines 3-5; column 1,

lines 58-60).

Regarding claims 4, 12, and 20, the replacement policy as noted above is an

LRU policy. Since any item in the cache could be left with an uncleared used bit, it is

possible that the most least-recently used item may not be the item selected for

invalidation (col. 4, lines 45-49 & 59-60).

Regarding claims 5, 13, 21, and 29, when an item remains with the used bit still

marked after a clearing operation, the item will be replaced prior to the least-recently-

used item according to the LRU policy, thus altering the policy by not replacing what

would have been the next cache item to be replaced but rather that of the invalidated

cache item.

Regarding claim 17 (cont.), one of ordinary skill in the art would appreciate that

for any type of replacement system to occur, here a pseudo-LRU with a valid-used bit

clearing replacement scheme, the conditions and operational instructions necessary for

the replacement system to work must be stored within a data storage system within the

computing system. Since the replacement system of Csoppenszky includes the above-

mentioned scheme, the replacement system must inherently store the means for which

to do so in any number of locations, such as on the processor itself or within an external

data storage device.

Regarding claim 25 (cont.), although not explicitly stated, for cache operations to

occur on cache lines with corresponding (valid) bits, some form of cache control logic

must be present and therefore would be inherent to the teaching of Csoppenszky.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 7, 14, 15, 22, and 23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Csoppenszky (US# 5,802,568) and Funk et al. (US# 6,314,561).

The difference between the claimed subject matter and that of Csoppenszky,

disclosed supra, is that the claims recite that the replacement instruction is generated

by a compiler or is part of an application kernel. Regarding claims 7, 15, and 23, Funk

et al. teaches a data cache management mechanism that is created by an optimizing

compiler. The compiler places non-blocking preload instructions into the instruction

stream of the computer system so as to minimize both the frequency and detrimental

effect of cache misses (column 3, lines 17-22). Thus, the compiler hopes to minimize

cache misses by loading data from the main memory into the cache. This directly

relates to the cache loading and replacement scheme of Csoppenszky. The creation of

the data cache management mechanism relates to the claimed material of claims 6, 14,

and 22, in that a kernel is a core processing mechanism used within a computer

system. The optimization compiler of Csoppenszky sends commands for optimizing the

caching system as well as controlling the data cache management mechanism, such

that parts of the mechanism are present in all mechanism that were compiled by the

optimization compiler (column 6, line 66 – column 7, line 11). Therefore it would have

been obvious to one of ordinary skill in the art having the teachings of Csoppenszky and

Funk et al. before him at the time the invention was made to modify the caching system

of Csoppenszky to include the optimization compiler/data cache management

mechanism of Funk et al., because then instruction could be pre-loaded into the

instruction stream in order to curb the frequency of cache misses, as taught by Funk et

al.

Claims 8, 16, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Csoppenszky (US# 5,802,568) and Worley, Jr. et al.

The difference between the claimed subject matter and that of Csoppenszky,

disclosed supra, is that the claims recite that an instruction for designating replacement

is an extension of a memory access instruction. Worley, Jr. et al. teaches a caching

system with a corresponding flush data cache instruction. In order to flush, the item

must first be selected for removal, hence the extension. The cache line is written back

to main memory if the cache line's dirty bit is set (column 4, lines 36-40). Therefore it would have been obvious to one of ordinary skill in the art having the teachings of Csoppenszky and Worley, Jr. et al. before him at the time the invention was made to modify the caching and clearing scheme of Csoppenszky to include the flush data cache instruction of Worley, Jr. et al., because then a system for writing back altered data to the main memory would be in place that would negate the loss of potentially important information, as taught by Worley, Jr. et al.

Response to Arguments

Applicant's arguments filed August 7, 2002 have been fully considered but they are not persuasive. The Examiner has better clarified the use of the Worley reference for the Applicant. In order to flush an item, an item must first be selected. If the item is dirty, the item needs to be written back to memory before being flushed. Therefore, it can be seen that the clearing and importance-level operations are an extension of a larger operation (flush and write-back).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Brian R. Peugh whose telephone number is 703-306-

5843. The examiner can normally be reached on Monday-Thursday from 7:00am to

4:30pm. The examiner can also be reached on alternate Friday's.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Matthew M. Kim, can be reached on (703) 305-3821. The fax phone number

for the organization where this application or proceeding is assigned is 703-746-7239.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 703-305-

9600.

MMK/BRP
August 27, 2002

MATTHEW KIM
SUPERVISORY PATENT EXAMINER
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